REMARKS

In response to the Office Action of June 6, 2003, Applicants have amended the claims, which when considered with the following remarks, is deemed to place the present application in condition for allowance. In addition, Applicants have added claims 48-51 which further define the present invention and recite subject matter to which Applicants are entitled. Favorable consideration of all pending claims is respectfully requested.

In the first instance, Applicants through the undersigned, wish to thank Examiners Collins and Nelson for their time and consideration in granting a personal interview with the undersigned and representatives from CropDesign on October 14, 2003. Applicants further thank Examiner Collins for the helpful suggestions made during the course of the interview, where it was indicated that the presently amended claims would be favorably considered.

Claim 42 has been objected to due to its reciting "claims" in reference to claim 1. As presently amended, claim 42 no longer recites "claims." Withdrawal of the objection to claim 42 is respectfully requested.

Claims 1-4, 6-8, 10, 27 and 30-47 have been rejected under 35 U.S.C. § 112, first paragraph, as allegedly violative of the written description requirement. The Examiner has maintained that the claimed invention is not adequately described because the claims allegedly continue to recite sequences whose structure and function are not described.

Submitted herewith as Exhibit A is an article by Kono, A., et al. (July 2003) "Arabidopsis D-Type Cyclin CYCD4;1 is a Novel Cyclin Partner of B2-Type Cyclin-Dependent Kinase" *Plant Physiology, 132*:1315-1321. Applicants respectfully submit that the presently claimed isolated DNA molecules encode the same D-Type cyclin of *Arabidopsis* described in Kono et al., i.e., CYCD4;1 described throughout the specification of the present application, e.g., pages 5-6,

and page 7, lines 1-2. Further, Kono et al. have demonstrated that CYCD4;1 forms protein complexes with CDKA;1 and CDKB2;1 in insect cells, and the complexes are active in terms of histone H1-activity. Such results demonstrate that CYCD4;1 functions as a cyclin subunit by controlling kinase activities of CDKA;1 and CDKA;2 in living cells. Thus, Applicants' novel D-type cyclin has been shown to make an active kinase complex with B2-type CDK. The function of activating a cyclin-dependent kinase has therefore positively been accorded to Applicants' disclosed and claimed D-type cyclin.

The Examiner has also stated that DNA sequences hybridizing under the conditions set forth in the claims "would not have a defined structure correlated with a function." Office Action, page 3. The Examiner has further posited that "even the recitation of a function would not overcome the rejection, because the claims encompass mutants and allelic variants that are not disclosed." Office Action, page 4, lines 1-2. In response to the position of the Examiner, Claims 1 and 39 have been amended so that they no longer recite hybridization conditions but rather, recite amino acid sequences having at least 50% sequence identity to the amino acid sequence set forth in SEQ ID NO:2 and having the amino acid motif QLLAVACLSLAAKXEET, wherein X is any amino acid and wherein the motif comprises zero or up to two mismatches. As discussed during the personal interview, Applicants have discovered a new class of D-type cyclin and have provided means for distinguishing the class from what was known in the art at the time of filing the application. Submitted herewith as Exhibit 2 is a similarity-identity matrix, which is effectively, an updated version of Table 1 provided in the specification. Sequence identities are shown below the divide and sequence similarities are shown above the divide. Out of a whole range of related cyclins, there is only one sequence which has a sequence identity greater than 50% to that of SEQ ID NO:2. *See*

Arath-CYCD4;2, which exhibits a 60.1% sequence identity to the sequence set forth in SEQ ID NO:2. The genomic clone carrying CYCD4;2 was deposited in the public data base on April 28, 2000 as Accession No. AL353995. A more recent prediction of CYCD4;2 cDNA was deposited on May 6, 2003, made public on September 16, 2003 as Accession No. NM 121082.

The structure and function of Applicants' claimed genus is adequately described in the specification. For example, page 10, lines 6-19 describes various homologies between cyclins, including those having a 50% identity. Example 2 demonstrates that Applicants' D-type cyclin binds both CDC2aAt and CDC2bAt. Example 4 demonstrates that the native gene encoding Applicants' D type cyclin in induced by cytokinin and/or sucrose. Page 10, lines 4-5 describe a fragment comprising amino acid residues 78 to 182 of SEQ ID NO:2. Within this fragment, and as depicted in Figure 1 for CYCK4, is the sequence QLLAVACLSLAAKXEET (amino acid residues 124-140 of SEQ ID NO:2). This motif is presently recited in claims 1, 39, and 49 and allowing from 0 to two mismatches. Applicants submit that even with up to two mismatches, CYCD2, CYCD1 and CYCD3 do not fall within the scope of claims 1, 39, or 49, since these cyclins all exhibit less than 50% identity to Applicant's CYCD4;1. *See* specification, page 6, and Table 1. In addition, the specification clearly teaches that Applicants' newly discovered protein is a D-type cyclin, which teaching has been verified by others, e.g., Kono et al.; *see* Exhibit A. Thus, Applicants were in possession of the presently claimed invention as of the filing date of the present application. Withdrawal of the rejection of claims 1-4, 6-8, 10, 27 and 30-47 under 35 U.S.C. § 112, first paragraph, is therefore warranted.

Claims 1-4, 6-8, 10, 27, and 30-47 have been rejected under 35 U.S.C. §112, first paragraph, as allegedly directed to non-enabled subject matter. The Examiner has stated "[t]he Office maintains that the establishment of a specific biological function such as the activation of

a cyclin-dependent kinase would advance prosecution at least with respect to the question of enablement of the claimed isolated DNA sequences." Office Action, page 4, last full paragraph. Applicants repeat, reassert, and incorporate by reference, the discussion above which evidences that Applicants' claimed DNA sequences do in fact encode a D-type cyclin with a specific biological function.

Further, the Examiner has maintained the position that the invention is not enabled for cyclin encoding nucleic acid molecules inducible by any mitogenic agent other than the exemplified sucrose and cytokinin. To support this position, Soni et al. has been cited for teaching an Arabidopsis D-type cyclin δ2 inducible by sucrose as well as an Arabidopsis D-type cyclin δ3 induced by cytokinin, and an Arabidopsis D-type cyclin δ1, which is not inducible by either cytokinin or sucrose. In response to this part of the rejection and in order to advance prosecution of this application, claims 2, 42, and 45 have been amended to recite "inducible by cytokinin and/or sucrose."

As indicated on page 5 of the Office Action, the Examiner has also maintained the position that the present invention is allegedly non-enabled for "modulating" the plant cell cycle, plant cell division or growth by modulating the level or activity of a cyclin. In particular, the Examiner believes that the specification does not provide sufficient guidance for one skilled in the art to both increase and decrease the plant cell cycle, plant cell division or growth and the level of activity of a cyclin by using a single method. In response to this rejection and also to the rejection of claims under the second paragraph of section 112 (*see* below), claim 38 has been amended to recite: "[a] method for promoting plant cell division, plant cell proliferation or growth which comprises increasing the level or activity of a cyclin that binds CDC2a in a plant cell wherein said cyclin comprises the sequence set forth in SEQ ID NO:2." Claim 39 has been

amended similarly. Claim 40 has been amended to recite "[t]he method of claim 39 wherein increasing the level or activity of the cyclin that binds CDC2a is achieved by overexpressing one or more of said DNA sequences in a plant cell." In addition, Applicants have added claims 48-50, directed to arresting cell division or preventing re-entry into the cell cycle by decreasing the level or activity of a cyclin that binds CDC2a. Support for claims 48-50 may be found throughout the specification, e.g., page 20, lines 17-20 and page 21, lines 11-18, In view of the amendments to the claims and the remarks hereinabove, withdrawal of the rejection of claims 1-4, 6-8, 10, 27, and 30-47 under the enablement provision of 35 U.S.C. §112, first paragraph, is respectfully requested.

Claims 38-39, and claims dependent thereon, have been rejected under 35 U.S.C.§ 112, second paragraph, as allegedly indefinite in the recitation of "modulating." As described above, and as suggested by the Examiner, claims 38-39 have been amended to recite specific changes in the plant cell cycle, plant cell division or growth and in the level or activity of cyclin.

Claim 2 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in the recitation of "enhanced" since, according to the Examiner, "enhanced" is a relative term that lacks a comparative basis. Claim 2 is presently amended so that it no longer recites "enhanced".

Claims 2, 38, 39, 40, and 41 and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in recitation of "CDC2a." In addition, claim 3 and claims dependent thereon have been rejected under the same statutory section as allegedly indefinite in their recitation of "CDC2aAt." In response to the rejection, claim 2 has been amended to recite in relevant part: "a cyclin dependent kinase" Claim 3 has also been rejected under 35 U.S.C. 112, second paragraph, as allegedly indefinite in reciting CDC2aAt"

Claim 3 has been amended to recite in relevant part: "wherein said cyclin dependent kinase is CDC2aAt of *Arabidopsis thaliana*. Withdrawal of the rejection of claims 2, 38, 49, 40, and 41 is therefore warranted.

Claims 2, 4, 10, 32 and 45, and claims dependent thereon, have been rejected under 35 U.S.C. 112, second paragraph, as allegedly indefinite in the recitation of "wherein the DNA sequences encoding a cyclin is inducible by mitogenic agents." In the interest of advancing prosecution of this application, claim 2 has been amended to recite in relevant part: "wherein expression of the native gene encoding the cyclin is inducible by sucrose and/or cytokinin." Claim 10 has been canceled. Claims 42 and 45 have been amended to recite in relevant part: "wherein expression of the native gene encoding the cyclin is induced by sucrose and/or cytokinin."

Claim 4, and claims dependent thereon, have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly indefinite in the recitation of "obtainable." Also according to the Examiner, the claims are indefinite since it is unclear whether the mitogenic agent or the DNA sequence is obtainable by the method of claim 2 or 3. In response to the rejection, claim 4 has been amended to recite: "[a]n isolated DNA molecule encoding a cyclin obtained by the method of claim 2 or 3."

Claims 2, 4, 10, 42, and 45, and claims dependent thereon, have been rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite in the recitation of "wherein the DNA sequence is inducible by mitogenic agents." Claims 2, 4, 42, and 45 have been amended to indicate that expression of the native gene is induced by sucrose and/or cytokinin.

Claim 4 and claims dependent thereon have been rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite in recitation of "obtainable". In response to the rejection, claim

4 has been amended to recite "[a]n isolated DNA molecule encoding a cyclin obtained by the method of claim 2 or 3."

Claim 27 and 37, and claims dependent thereon, are rejected under 35 U.S.C. §112, second paragraph, as being indefinite in the recitation of "means" as a "means" is not a product in a composition. As presently amended, claims 27 and 37 no longer recite "means."

Claim 42, and claims dependent thereon, has been rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite in the recitation of "inducible". As presently amended claim 42 recites "induced" rather than "inducible."

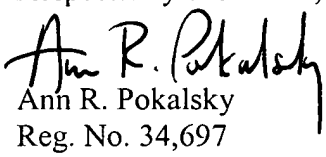
In view of the amendments to the claims and the remarks hereinabove, withdrawal of the rejection of claims 2, 4, 10, 27, 32, 37, 42, and 45 under 35 U.S.C. § 112, second paragraph, is warranted.

Claims 1-4, 6-8, 10, 27, and 30-47 have been rejected under 35 U.S.C. § 101 as allegedly not supported by either a specific asserted utility or a well established utility as described by the Examiner in the Office Action of November 19, 2002. In that office action, the Examiner stated that "recitation of a specific function for the claimed DNA does not impart utility on the DNA in the absence of evidence sufficient to establish that the claimed DNA encodes a functional protein." November 19, 2002 Office Action, page 11.

In response to the rejection, Applicants repeat, reassert, and incorporate by reference, the discussion above related to Exhibit A and Applicants' novel D-type cyclin having been demonstrated to make an active kinase complex with a B2-type CDK. The function of activating a cyclin-dependent kinase has therefore positively been accorded to Applicants' disclosed and claimed D-type cyclin. Withdrawal of the rejection of claims 1-4, 6-8, 10, 27, and 30-47 under 35 U.S.C. § 101 is therefore warranted.

In view of the foregoing amendments and preceding remarks, it is respectfully submitted that the present claims are in condition for allowance, which action is respectfully solicited. The Examiner is invited to please telephone the undersigned if possible, in order to resolve any outstanding issues, e.g., by and Examiner's amendment.

Respectfully submitted,



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